Keystone Species in Minnesota Ecosystems

Course: 7th grade Science

Adapted from Megan Olivia Hall, Saint Paul Public Schools

Minnesota State Science Standards

7.4.2.1.1 - Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem.
7.4.2.1.2 - Compare and contrast the roles of organisms with the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer.
7.4.2.1.3 - Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition.
7.4.4.1.2 – Describe ways that human activities can change the populations and communities in an ecosystem.

Goal

Students will demonstrate place-based knowledge of Minnesota ecosystems.

Materials

The Incredible Journey of the Butterflies[1]
Postcards with scientific illustrations
Article: Monarch butterflies threatened by GM crops in U.S.[2]
Field guides (birds, reptiles, fish, insects, etc.)
Descriptions of Minnesota ecosystems[3]
Back issues of *Minnesota Conservation Volunteer*
Reproducible Documents

- Notecatchers
  - Silent Gallery
  - Levels of Organization in an Ecosystem
  - Adaptations
  - Minnesota Ecosystems
- Directions with Rubric
  - Populations & communities in Minnesota ecosystems poster presentation
  - Keystone Species Postcard Project
- Fishbowl Discussion Role Cards
- Ecological Roles Foldable
- Guided Research

Additional Prep

Coordinate an expert presentation on Minnesota species by a National Park Service ranger.
Plan an Urban Wilderness Canoe Adventure with Wilderness Inquiry.

Procedure for Implementation

Note: These lessons are designed to take place intermittently throughout a larger ecology unit in a 7th grade life science. Here is a general outline of when they could occur in class:

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[1] http://video.pbs.org/video/1063682334/
[2] http://www.theglobeandmail.com/technology/science/monarch-butterflies-threatened-by-gm-crops-in-us-study-says/article18994894/
[3] http://dnr.state.mn.us/biomes/index.html, http://classroom.willstegerfoundation.org/

- The first three of the six lessons occur at the very beginning of the ecology unit. These lessons serve as a unit kickoff and are designed to be engaging and to inspire curiosity.
- Between lessons three and four, students will experience an Urban Wilderness Canoe Adventure with Wilderness Inquiry. Part of their assignment during the adventure will include observing species in the wilderness and discussing those species' ecological roles.
- The remaining three lessons each occur after the three ecology quizzes. After reviewing the quiz results, students will either immediately begin the lesson – or, in the case of those who failed their quizzes, they will first retake their quiz and then begin the lesson.
- Each lesson occurs on a block schedule and is approximately 80 minutes in length.

Lesson 1: Expedition Kick-off

Goal	I can identify the role of monarchs and other butterflies in Minnesota ecosystems, describing their relationships with plant and human populations.
Access	Mystery Piece: Clip from *The Incredible Journey of the Butterflies*[4] • What role do monarchs and other butterflies play in Minnesota's ecosystems? • Why are butterflies important to our ecosystems?
New Information	Silent Gallery: Exemplar Postcards • See Silent Gallery Notecatcher in Appendix Provocative Common Text • Monarch butterflies threatened by GM crops in U.S.[5] o Silent read for gist o Silent read with text coding o Vocabulary debrief
Apply	Fishbowl discussion based on article, with these roles: o Conventional farmer on a large farm with GM crops o Community Supported Agriculture organic farmer o Monarch Watch Organizer o Retired community member who loves to garden o State senator in charge of finance committee • See Fishbowl Discussion Role Cards in Appendix • 5 students have discussion, remaining class members track discussion (each observer follows one discusser)
Generalize	Levels of Organization in an Ecosystem notecatcher [6] • Based *Prentice Hall Science Explorer Life Science,* chapter 21.1 • See Levels of Organization Notecatcher in Appendix

Lesson 2

Goal	I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.
Access	Students draw simple food webs in their science notebooks, indicating monarch butterflies, their food sources, and potential predators.

[4] http://video.pbs.org/video/1063682334/
[5] http://www.theglobeandmail.com/technology/science/monarch-butterflies-threatened-by-gm-crops-in-us-study-says/article18994894/
[6] http://api.ning.com/files/V-WKbXgs4uXR4aK04xfJ0i6M*mj26Bzv1nKy9XupUqFd*kkpwz-covXajvWrvzt-GnWo1iXEfr5iemwcHuk-L2bAfwMmLeGA/NotesLevelsOfOrganization2.jpg

New Information	National Park Service Expert Presentation: Minnesota's Ecosystems & Keystone Species • Students take notes and record questions • Presentation includes an activity that matches ecological disturbances with organisms' adaptations • See Adaptations Notecatcher in Appendix
Apply	Question and answer session with National Park Service ranger expert
Generalize	Class discussion of Adaptations Notecatcher

Lesson 3

Goal	I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.
Access	Exit Slip: Life Science ~ MN Ecological Communities (1 of 2) • Review with seat partners and revise as needed
New Information	Back issues of *Minnesota Conservation Volunteer* • See poster prep worksheet in Appendix
Apply	Populations & communities in Minnesota ecosystems poster presentation • Students generate rubric at beginning of poster making process • 45 minutes to create posters based on prep sheets; 15 minutes for stay-and-stray presentations
Generalize	Exit Slip: Life Science ~ MN Ecological Communities (1 of 2) • See Appendix for Exit Slip

Lesson 4

Goal	I can compare and contrast the roles of organisms with the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer. I can explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition. I can describe ways that human activities can change the populations and communities in an ecosystem.
Access	Review Ecology Quiz 1 • Revise and retake if necessary
New Information	Introduction of Keystone Species Postcard Project • Review of exemplars from silent gallery • Explication of project directions and rubric (in Appendix) • Emphasis on outreach and service aspects of the project: these postcards will go out into the world to influence and inspire people to care for the species we depict.
Apply	Keystone Species Postcard Project, Step 1: Guided Research • See Appendix for Guided Research Notecatcher
Generalize	**Exit Slip: Life Science ~ MN Ecological Communities (2 of 2)** • See Appendix for Exit Slip

Lesson 5

Goal	I can create an accurate and beautiful illustration of my selected Minnesota keystone species.
Access	Review Ecology Quiz 2 • Revise and retake if necessary
New Information	Direct instruction from the school art teacher on scientific illustration (20 minutes)
Apply	Keystone Species Postcard Project, Step 2: Keystone Species Illustration • See directions and rubric in Appendix
Generalize	Exit ticket question: • Give two ways that art can inspire people to care for the environment.

Lesson 6

Goal	I can revise my keystone species postcard project, demonstrating knowledge of ecological roles and relationships, abiotic factors, and human impacts on ecosystems.
Access	Review Ecology Quiz 3 • Revise and retake if necessary
New Information	Review project feedback from science teacher, art teacher, and National Park Service Scientists (if available).
Apply	Keystone Species Postcard Project, Step 3: Revise illustration and blurb for postcard.
Generalize	Exit ticket question: • What are the next steps for your postcard? Is it ready to print? Where would you like to see your postcard distributed – where would it do the most good?

Overall Unit Structure

I can identify a variety of populations and communities in Minnesota.	7.4.2.1.1 - Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem.	**Minnesota Ecological Communities Kickoff** Mystery Piece: Clip from *The Incredible Journey of the Butterflies*[7] Silent Gallery: Wildlife Postcards Provocative Common Text: Monarch butterflies threatened by GM crops in U.S.[8] Activating Schema 1: Levels of organization in an ecosystem notecatcher (chapter 21.1) Anchor Chart: Ecological roles Expert folder • Field guides (birds, reptiles, fish, insects, etc.) • Descriptions of Minnesota ecosystems[9] • Back issues of *Minnesota Conservation Volunteer* Activating Schema 2: Populations & communities in MN ecosystems poster presentation/notecatcher NPS Expert Presentation: Minnesota's Ecosystems & Keystone Species Service Learning Projects: Keystone Species Postcards, Monarch Waystation, Milkweed Giveaway				E1-3
Learning Target	Standard	Supporting Targets	Learning Activities	Book	Formative Assessment	Date

[7] http://video.pbs.org/video/1063682334/

[8] http://www.theglobeandmail.com/technology/science/monarch-butterflies-threatened-by-gm-crops-in-us-study-says/article18994894/

[9] http://dnr.state.mn.us/biomes/index.html, http://classroom.willstegerfoundation.org/

I can describe the relationships among the populations and communities in a stable Minnesota ecosystem.	7.1.1.2.2 - Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables, ensuring that one variable is systematically manipulated, the other is measured and recorded, and any other variables are kept the same (controlled). 7.1.3.4.2 - Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a life science context.	I can plan and conduct a controlled experiment to test a relationship between two variables.	Microscope Presentation	p. 770	Do Now: Experimental Design Worksheet Microscope Lab Scientific Method Book: Change in a Tiny Community Lab (background reading) (populations & communities in MN ponds notecatcher) (set up)	E4-5
	7.4.2.1.2 - Compare and contrast the roles of organisms with the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer.	I can compare and contrast predator/prey, parasite/host, and producer/consumer/ decomposer relationships.	OWL Articles, Research HW	21.3	Owl Pellets Lab	E6
			Movie: *Predator Prey* (Disney)		Analyzing Data: Predator-Prey Interactions (p. 725)	E7
			Symbiosis Notes Good Buddies		Ecological Relationships Notecatcher	E8
	Ecology Quiz 1: I can describe the relationships among the populations and communities in a stable Minnesota ecosystem. Review = Kickoff notecatchers (2) & ponds notecatcher (1) & ecological relationships notecatcher (1)					
	Intervention: Revise, Reflect, Retake Enrichment: Keystone Species Postcard Project, Step 1: Research worksheet					+1
I can describe relationships between populations, communities, and non-living factors in an ecosystem. I can describe the flow of matter and energy in an ecosystem.	**7.4.2.1.3 -** Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition. 7.1.1.2.3 - Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation). 7.7.1.1.1.2 - Understand that when similar investigations give different results, the challenge is to judge whether the differences are significant, and if further studies are required.	I can explain how biotic and abiotic factors limits the number of populations and ecosystem can support. I can use scientific results to generate a scientific conclusion from an investigation. I can judge when different results from the same experiment are significant, and if further studies are required.	How Many Bears Can Live in this Forest?	21.2	Counting Turtles Lab (p. 719)	E9
			Habitat Rummy	22.4	Change in a Tiny Community Lab: Analysis & Conclusion	E10
					Minnesota's Changing Climate Lesson 2	E11
	7.4.2.2.1 Recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process	I can recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process	Photosynthesis Rap[10] & Mini-Lecture Nova: Illuminating Photosynthesis[11]	3.3	Photosynthesis Flow Chart Notes[12]	E12

[10] Available: http://www.youtube.com/watch?v=pE82qtKSSH4
[11] Available: http://www.pbs.org/wgbh/nova/nature/photosynthesis.html
[12] Short video: http://www.teachersdomain.org/resource/tdc02.sci.life.stru.photosynth/

	called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.	called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.				
	7.4.2.2.2 Describe the roles and relationships among producers, consumers and decomposers in changing energy from one form to another in a food web within an ecosystem.	I can describe the roles and relationships among producers, consumers and decomposers in changing energy from one form to another in a food web within an ecosystem.	Energy Pipeline from *Project WILD* *Big River Journey* Activity: Web of Life Game	22.1	Pass Along: Ecological Relationships Construct a food web to trace the flow of matter in a MN ecosystem. Megan O;Brian: Selfie Food Web	E13
	7.4.2.2.3 Explain that the total amount of matter in an ecosystem remains the same as it is transferred between organisms and their physical environment, even though its form and location change.	I can explain that the total amount of matter in an ecosystem remains the same as it is transferred between organisms and their physical environment, even though its form and location change.	The Incredible Journey from *Project WET* (& SPPS DMC)	22.2	Incredible Journey Reflection Matter Cycle Mini-Posters	E14
	Review/Test 2: I can describe relationships between populations, communities, and non-living factors in an ecosystem. I can describe the flow of matter and energy in an ecosystem.					+1
	Intervention: Revise, Reflect, Retake Keystone Species Postcard Project, Step 3: Keystone species illustration					+1
I can describe human impacts and mitigations for Minnesota's ecosystems.	**7.1.3.4.1** Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context.	I can use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context.		23.1	*MN Changing Climate* Lesson 3 with Monarch Watch Data Analysis	E15
	7.4.4.1.2 Describe ways that human activities can change the populations and communities in an ecosystem.	I can describe ways that human activities can change the populations and communities in an ecosystem.		23.2	*MN Changing Climate* Lesson 4 with service action plan	E16
	7.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context.	I can use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context.		23.3	*MN Changing Climate* Lesson 5 with service action	E17
	7.1.1.2.4 Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations. **7.1.1.2.1** Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, review of existing work, and development of models.	I can evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations. I can generate and refine a variety of scientific questions and match them with appropriate methods of investigation.			Citizen Science Project: Monarch Waystation & Milkweed Giveaway	E18
	Review/ Test 3: I can describe human impacts and mitigations for Minnesota's ecosystems.					+1
	Intervention: Revise, Reflect, Retake Enrichment: Keystone Species Postcard Project, Step 4: Revising Artwork & Blurb					+1

Evaluation

Students will complete pre- and post-tests measuring:

- Proficiency in the four standards the lessons address and
- Students' affect regarding local ecological communities.

The pre-test will take place on the first day of the unit of study (see Appendix for pre-test).
Post-test questions will be incorporated into the three ecology quizzes.

Relation to Place-Based Education

These lessons are interwoven with place-based learning field work experiences:

- An Urban Wilderness Canoe Adventure with Wilderness Inquiry (one day)
- A full-day tour of green spaces in St. Paul (one day)
- An overnight team-building adventure at Baker Near Wilderness Settlement (two days)
- Service learning restoration work at Belwin Conservancy (one day)
- *Flight of the Butterflies* field trip at the Science Museum of Minnesota (one day)

The combination of in-class reflection and real-world experience deepens students connection to place and allows for memorable mastery of standards *through* our home city's parks and museums.

Appendix

Name _____ Period ____ Date _____

Silent Gallery Notecatcher

Pick a postcard that makes you *like* the plant or animal it shows.	What makes this postcard interesting, special, or inspiring?

Fishbowl Discussion Role Cards

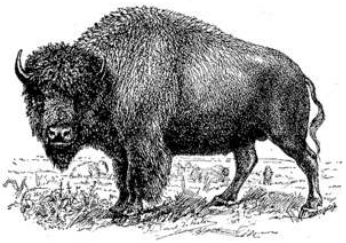
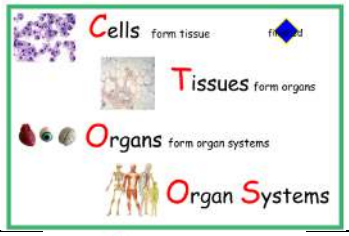
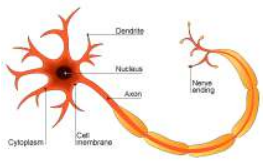
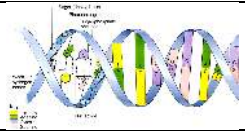
You are Farmer Collins, a conventional farmer on a large farm with genetically modified (GM) crops. Your corn doesn't die if you spray it with herbicides, and so you spray the chemicals to kill weeds. If you let the weeds grow, the weeds till take some of the water and nutrients away from your corn and you will grow less corn. You need to have a big crop yield to pay for your farm expenses and feed your family.
You are Farmer Jackson, a farmer who owns a community supported agriculture (CSA) organic farm. About 75 families give you money in the spring, and you grow and deliver diverse vegetables and fruits to these families all summer long. You don't use herbicides on your crops because you want to protect the environment, you prefer to keep chemicals away from your family (who works on the farm), and you can sell organic food for more money.
You are Dr. Taylor, an insect ecology professor and the director of Monarch Watch. Monarch Watch is a national organization dedicated to protecting monarch butterflies. In your opinion, "Monarch butterfly populations are declining due to loss of habitat. To assure a future for monarchs, conservation and restoration of milkweeds needs to become a national priority." Your organization does a lot of different things to protect monarchs, including giving away small milkweed plants so people can create more monarch habitats.

You are Neighbor Bee, are a retired community member who loves to garden. You grow butterfly friendly flowers in your garden for two reasons. One, you have noticed that more butterflies in your garden means more vegetables and fruits come from the same number of plants. Two, you think butterflies are beautiful and like to look at them with your grandchildren, ages 4 and 7. You volunteer in the neighborhood district council and are very respected by the local community.
You are Senator Ortega, the state senator in charge of the finance committee. You support monarch protection in theory, but you are not sure about setting aside money for monarchs. You want to keep the economy strong. You have the power to pass laws but need to be sure that your voters will approve before you make a move.

Name _____ Period ____ Date _____

Levels of Organization in an Ecosystem Notecatcher

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

Biosphere	The part of Earth that encompasses all living things	
		
		
		
		
Groups of Cells	Tissues Organs Organ Systems	
Cell	The smallest unit of life	
Molecule	Groups of atoms bonded together	

Levels of Organization in an Ecosystem Notecatcher Answer Key

13 **FIGURE 1–21 LEVELS OF ORGANIZATION**

Biosphere	The part of Earth that contains all ecosystems	
Ecosystem	Community and its nonliving surroundings	 Hawk, snake, bison, prairie dog, grass, stream, rocks, air
Community	Populations that live together in a defined area	 Hawk, snake, bison, prairie dog, grass
Population	Group of organisms of one type that live in the same area	 Bison herd
Organism	Individual living thing	 Bison
Groups of Cells	Tissues, organs, and organ systems	 Nervous tissue Brain Nervous system
Cells	Smallest functional unit of life	 Nerve cell
Molecules	Groups of atoms; smallest unit of most chemical compounds	 Water DNA

Fishbowl Observation Sheet

Your name _____

Person you are observing _____

How many times did they speak? (Keep a tally) _____

Did they make use of the text? (Circle one) Yes No

Did they offer new ideas? (Circle one) Yes No

Fishbowl Observation Sheet

Your name _____

Person you are observing _____

How many times did they speak? (Keep a tally) _____

Did they make use of the text? (Circle one) Yes No

Did they offer new ideas? (Circle one) Yes No

Fishbowl Observation Sheet

Your name _____

Person you are observing _____

How many times did they speak? (Keep a tally) _____

Did they make use of the text? (Circle one) Yes No

Did they offer new ideas? (Circle one) Yes No

Name _____ Period _____ Date _____

Adaptations Notecatcher

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.
Supporting Target: I can explain how adaptations enable survival.

As you do the matching activity & listen to Ranger Goodspeed's presentation, fill out this table.

Minnesota Species	Disturbance	Adaptation	Community

Name _____ Period ____ Date _____

Populations and Communities Expert Folder Poster Preparation

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

Materials:
Your *Prentice Hall Science Explorer Life Science* textbook turned to page 707
Back issues of the *Minnesota Conservation Volunteer*

Warm-Up: Use your textbook, page 707, to review the following vocabulary terms.
What is a population? _____

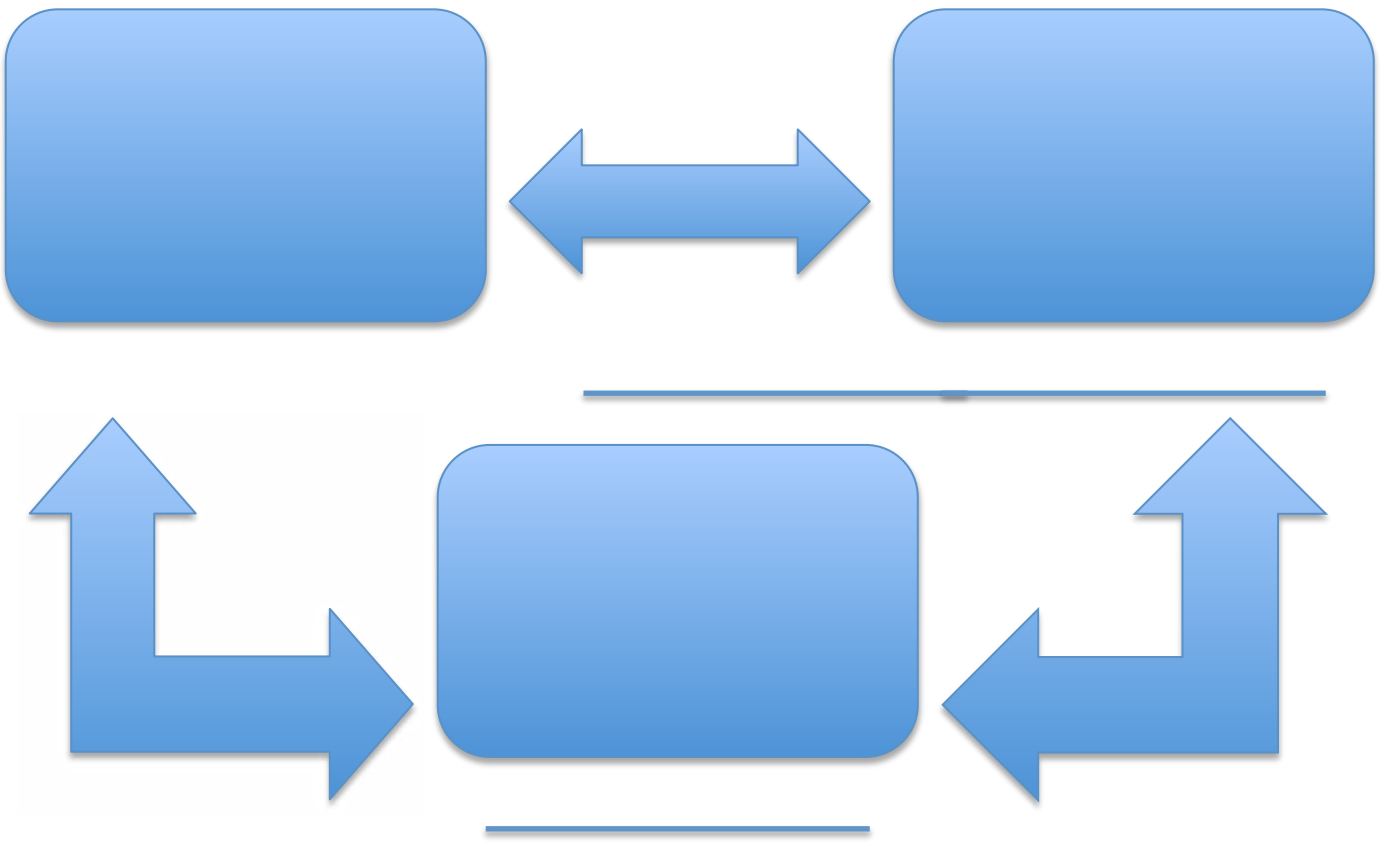
_____

What is a community? _____

_____

Choose an issue of the *Minnesota Conservation Volunteer* magazine with a Minnesota species that is interesting to you.

1. Draw a population of your species in one of the bubbles below.
2. Use the spaces under the bubbles to label the population.
3. Think about what your species eats and/or what eats it. Are there other species that compete with your species for food? Use the arrows between the bubbles to show how your species is connected to two other populations (predator/prey, competitors, symbiosis, etc.).



Name _____ Period _____ Date _____

Exit Slip: Life Science ~ MN Ecological Communities (1 of 2)

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

What is a habitat?

What is a population?

What is a community?

Name _____ Period _____ Date _____

Exit Slip: Life Science ~ MN Ecological Communities (1 of 2)

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

What is a habitat?

What is a population?

What is a community?

Name _____ Period _____ Date _____

Exit Slip: Life Science ~ MN Ecological Communities (1 of 2)

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

What is a habitat?

What is a population?

What is a community?

Name _____ Period _____ Date _____

Exit Slip: Life Science ~ MN Ecological Communities (2 of 2)

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

Name and describe a habitat in Minnesota.

What is a population in this habitat? _____

What is a community in this habitat? _____

Name _____ Period _____ Date _____

Exit Slip: Life Science ~ MN Ecological Communities (2 of 2)

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

Name and describe a habitat in Minnesota.

What is a population in this habitat? _____

What is a community in this habitat? _____

Name _____ Period _____ Date _____

Exit Slip: Life Science ~ MN Ecological Communities 2 of 2)

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

Name and describe a habitat in Minnesota.

What is a population in this habitat? _____

What is a community in this habitat? _____

Keystone Species Postcard Project Directions & Rubric

Learning Target: I can identify a variety of populations and communities in a Minnesota ecosystem and describe the relationships among these populations and communities.

Supporting Targets
I can create an accurate and beautiful illustration of my selected Minnesota keystone species.
I can write a concise, persuasive argument stating a species' essential role in an ecosystem.

1. Revise your illustration until it meets the target.
2. Review your guided research worksheet. Pick out the most important details. Write a two-sentence argument stating why your species is important for the survival of its ecosystem.

Rubric for Creative Projects in Science at Open World Learning Community

CATEGORY	Exemplary	Proficient	Developing	Novice
Content	Covers topic in-depth with details and examples. Subject knowledge is excellent.	Includes essential knowledge about the topic. Subject knowledge appears to be good.	Includes essential information about the topic but there are 1-2 factual errors.	Content is minimal OR there are several factual errors.
Workload	The workload is divided and shared equally by all team members.	The workload is divided and shared fairly by all team members, though workloads may vary from person to person.	The workload was divided, but one person in the group is viewed as not doing his/her fair share of the work.	The workload was not divided OR several people in the group are viewed as not doing their fair share of the work.
Originality	Product shows a large amount of original thought. Ideas are creative and inventive.	Product shows some original thought. Work shows new ideas and insights.	Uses other people's ideas (giving them credit), but there is little evidence of original thinking.	Uses other people's ideas, but does not give them credit.
Polish	Project is neat, organized, and easy to understand. Project is complete with strong evidence of effort.	Project is neat, organized, and easy to understand. Project is complete with some evidence of effort.	Project is either messy, disorganized, or hard to understand. Project is either incomplete or does not show strong evidence of effort.	Project is messy, disorganized, and hard to understand. Project is incomplete and does not show effort.

Name _____ Period ____ Date _____

Minnesota Species Project Guided Research

Your species name in English _____

Your species name in Latin _____

Where does your species live in Minnesota? Name the ecosystem. _____

Which biome includes this ecosystem? _____

How many individuals of your species live in Minnesota? _____

What abiotic and/or biotic factors limit this population's size? _____

_____

Is your species a producer, consumer, or decomposer? _____

Does your species photosynthesize? _____ Cellular respiration? _____

If your species is a consumer or decomposer, what does it eat? _____

_____

What eats your species? _____

_____

Does your species have competitors for resources, and if so, what species are they?

_____

Does your species have any symbiotic relationships? _____

Mutualism, commensalism, amensalism, or parasitism? _____

What other species is involved? _____

Why does your species do well in this environment? Describe adaptations, foods, shelters, etc. _____

_____

How have human activities affected your species? _____

_____

What do you wish humans would do for your species? _____

_____

Name _____ Period _____ Date_____

Life Science Keystone Species Project Pre-Test

_____ 1. What do scientists call all of the interacting organisms living in an ecosystem?
   a. Organism
   b. Population
   c. Community
   d. Ecosystem

_____ 2. What do scientists call the individuals of one species in a habitat?
   a. Organism
   b. Population
   c. Community
   d. Ecosystem

_____ 3. Temperature is how hot or cold a habitat is. What kind of factor is temperature?
   a. Biotic
   b. Carrying capacity
   c. Limiting factor
   d. Abiotic

_____ 4. This type of organism makes its own food from sunlight (or, in a few cases, geothermal) energy.
   a. Producer
   b. Primary consumer/herbivore
   c. Secondary consumer/carnivore
   d. Decomposer

_____ 5. This type of organism consumes producers for its energy.
   a. Producer
   b. Primary consumer/herbivore
   c. Secondary consumer/carnivore
   d. Decomposer

6. As you think about the Mississippi River trip, what are you most looking forward to?

7. What are <u>TWO</u> things that you hope to learn from the Mississippi River trip?

8. Do you have any concerns about canoeing on Mississippi River?

9. What other activities have you been on before? (Fill in ALL ovals that apply.)

- 0 Mississippi River Day Paddling Trip
- 0 Ranger Talks in my Classroom
- 0 Big River Journey
- 0 Journey to the Falls
- 0 Other _____

B. PERSONAL VIEWS

DIRECTIONS. Choose the *best* answer for each statement by completely filling in the oval.

	STRONGLY DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	**STRONGLY AGREE**
4. When I am in school, I feel like I belong.	0	0	0	0
5. I like learning in small groups.	0	0	0	0
6. I prefer learning through hands-on activities.	0	0	0	0
7. Environmental problems are not as bad as most people think.	0	0	0	0
8. I feel that I have a number of good qualities.	0	0	0	0
9. I like learning about science.	0	0	0	0
10. It is important for me to get good grades.	0	0	0	0
11. My family doesn't like to do outdoor activities.	0	0	0	0
12. I am afraid of getting sick or hurt while canoeing or walking in the woods.	0	0	0	0
13. My parents think it is important to learn about nature.	0	0	0	0
14. School is harder for me than it is for my classmates.	0	0	0	0
15. I am skilled at observing and recording data.	0	0	0	0